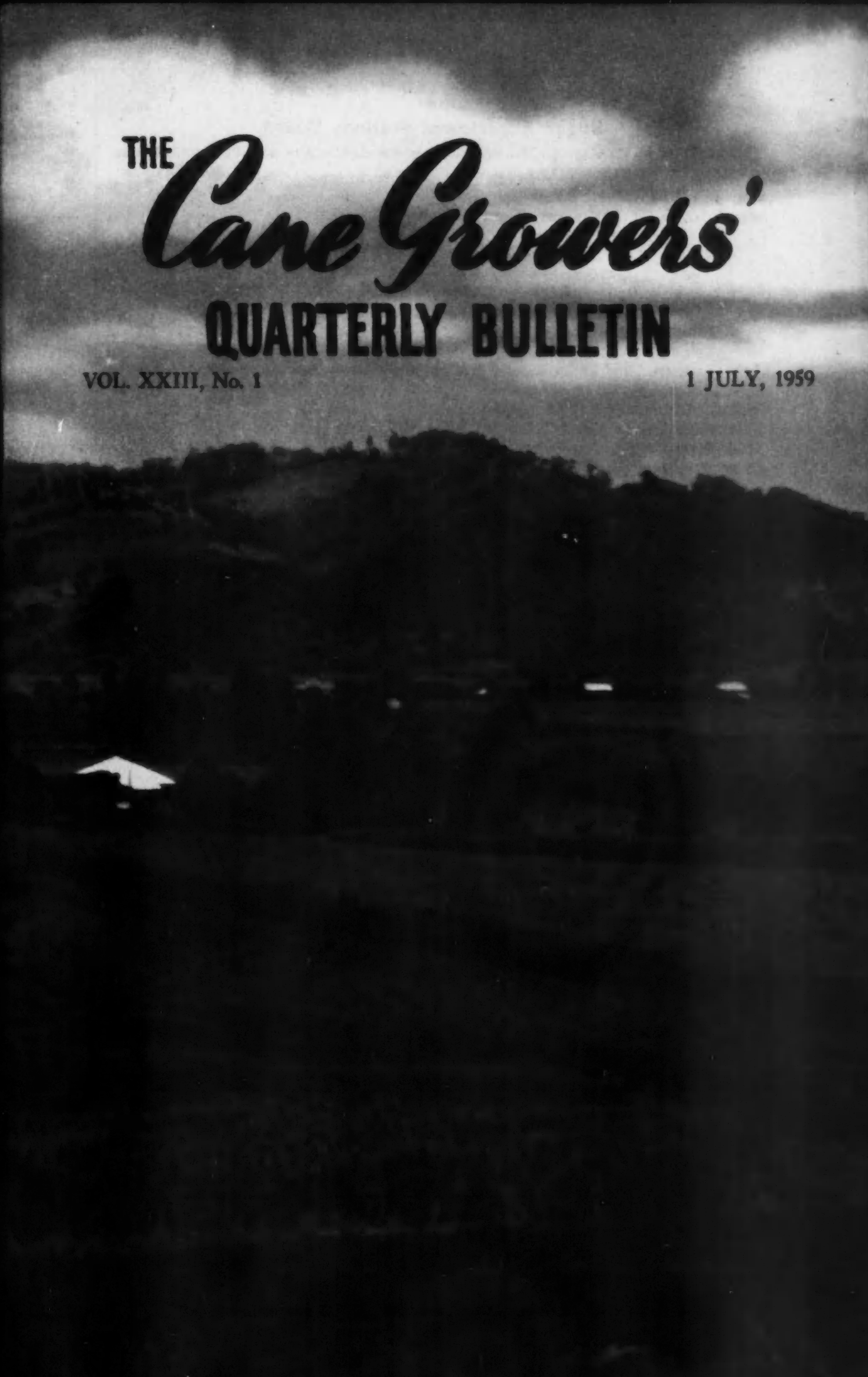
THE Cane Growers' QUARTERLY BULLETIN

VOL. XXIII, No. 1 1 JULY, 1959



Sugar Experiment Stations Board.

THE HON. O. O. MADSEN, M.L.A., Minister for Agriculture and Stock, Chairman.
DR. W. A. T. SUMMERVILLE, Deputy Chairman.
MR. J. W. INVERARITY, Member.
MR. L. G. SCOTNEY, Cane Grower, Member.

Bureau of Sugar Experiment Stations.

N. J. KING, Director.
L. G. VALLANCE, Asst. Director.
R. W. MUNGOMERY, Asst. to Director.

Head Office Staff.

J. H. NICKLIN, Chief Technologist (Engr.).
C. G. HUGHES, Senior Pathologist (I).
D. R. L. STEINDL, Senior Pathologist (I).
L. R. BRAIN, Senior Mill Technologist (II).
H. E. YOUNG, Senior Physiologist (II).
O. W. STURGESS, Research Pathologist.
K. C. LEVERINGTON, Chemist.
R. F. BEALE, Asst. Engineer.
A. D. DOOLAN, Laboratory Technologist.
J. R. BURGE, Analyst.
J. M. SEDL, Analyst.
C. C. HORNE, Secretary.
A. D. BEAL, Asst. Accountant.
S. C. LEDDY, Records Clerk.
E. J. Barke, Clerk.
B. HJELM, Clerk.
MISS F. M. DOOLAN, Librarian.
MISS E. O'SULLIVAN, Clerk.
MISS J. E. MURPHY, Clerk-Typiste.
MISS B. A. MURPHY, Clerk-Typiste.
MISS B. A. VINES, Clerk-Typiste.
MISS M. P. LYNCH, Clerk-Typiste.
F. SHORT, Sen. Lab. Attendant.

Country Staff.

Meringa. Address: P.O. Box 122, Gordonvale; Phone: Gordonvale 95.

J. H. BUZACOTT, Senior Plant Breeder (I).
G. WILSON, Senior Entomologist (I).
J. C. SKINNER, Senior Geneticist (I).
B. G. ADKINS, Research Mill Technologist.
B. T. EGAN, Pathologist.
B. E. HITCHCOCK, Entomologist.
G. BATES, Senior Adviser.
A. G. BARRIE, Agronomist.
C. A. REHBEIN, Adviser.
N. G. GRAFF, Technical Officer (I).
F. C. LINDSAY, Technical Officer (I).
G. H. WHITAKER, Field Assistant.
P. G. ARNOLD, Field Assistant.
N. J. BURMAN, Technical Officer (II).
MISS N. J. SMITH, Clerk-Typiste.
MISS M. BARBER, Clerk-Typiste.
R. C. MCALLOON, Lab. Attendant.

Innisfail. Address: P.O. Box 630, Innisfail; Phone: Innisfail 271.

S. O. SKINNER, Senior Adviser.
I. T. FRESHWATER, Adviser.

Ingham. Address: P.O. Box 41, Ingham; Phone: Ingham, 468.

O. W. D. MYATT, Senior Adviser.
I. J. V. STEWART, Field Assistant.

Ayr. Address: P.O. Box 28, Brandon; Phone: Brandon 45.

G. A. CHRISTIE, Senior Adviser.
J. WESDORP, Asst. Agronomist.
L. S. CHAPMAN, Adviser.
J. A. HUCKNALL, Field Assistant.
MISS B. L. LENNOX, Clerk-Typiste.

Mackay. Address: P.O. Box 280, Mackay; Phone: Mackay 2717.

G. C. BIESKE, Research Chemist.
C. G. STORY, Senior Adviser.
A. A. MATTHEWS, Adviser.
C. M. MCALEESE, Adviser.
L. E. RODMAN, Field Assistant.
J. E. MILLIKEN, Field Assistant.
D. A. BEAK, Cadet.
MISS J. L. CRONIN, Clerk-Typiste.
MISS C. HARVISON, Clerk-Typiste.
J. VELLA, Lab. Attendant.

Bundaberg. Address: P.O. Box 138, Bundaberg; Phone: Canelands 228.

R. DEICKE, Senior Mill Technologist (II).
A. G. CLAIRE, Mill Technologist.
R. B. MOLLER, Agronomist.
H. G. KNUST, Senior Adviser.
N. McD. SMITH, Senior Adviser.
E. D. JENSEN, Asst. Mill Technologist.
F. GALETTO, Asst. Mill Technologist.
J. ANDERSON, Adviser.
R. K. HILHORST, Technical Officer (I).
MISS J. PRIEBE, Clerk-Typiste.

Nambour. Address: P.O. Box 139, Nambour; Phone: Nambour 668.

C. L. TOOHEY, Adviser.

BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

THE CANE GROWERS' QUARTERLY BULLETIN

ISSUED BY DIRECTION OF THE
SUGAR EXPERIMENT STATIONS
BOARD

1 JULY, 1959

Wholly set up and printed in Australia by
WATSON FERGUSON AND COMPANY
Brisbane, Q.

CONTENTS

This Bulletin is an official publication of the extension service of the Bureau of Sugar Experiment Stations, issued and forwarded by the Bureau to all cane growers in Queensland.

The Cane Growers' Quarterly Bulletin

VOL. XXIII. 1 JULY, 1959 No. 1

EDITORIAL

Bureau Pathologists Honoured

The recently announced award by the Australian Institute of Agricultural Science to two Bureau Pathologists was a fitting tribute to a research result which has had repercussions throughout the sugar world.

The Bureau pathologists concerned, Graham Hughes and Dave Steindl, discovered firstly that a previously undetected and unknown disease existed, then proceeded to establish a cheap and effective method of curing the disease in planting material.

One of the implications of this research—unseen at the time, but realised later—was that it provided the first explanation of the mysterious decline in yielding capacity which had puzzled sugar cane agriculturists and geneticists for decades.

Probably no other single advance in the Queensland sugar industry has attracted such a degree of overseas interest in our scientific achievements. The discovery and control of ratoon stunting disease ranks with our spectacular pest control and our cane breeding successes.

Rocking Rakes for Early Cultivation

By C. G. Story

The latest addition to the range of cane implements developed in Mackay is an ingenious device known as Rocking Rakes. This machine may be assembled on any cultivator or grubber frame and may be operated by a power take off, a chain drive from the tractor wheel, or by a ground contact wheel. A brief description of the machine is as follows.

The tynes or working points which contact the ground in their various tasks are held in gangs of from two to seven points to a gang. The gangs themselves number from three to six or seven, according to the work to be performed; these are attached by clamps on to a square shaft which, in operation, is centred directly over the cane row and in line with it. This shaft is driven in a rocking motion from side to side by cams attached to a round shaft which crosses the gang-holding square shaft at right angles. The round shaft is chain driven from the tractor wheel or may be operated from a power take off. The cams that work the square or rocking bar contact a flat plate attached to the rocking bar, causing it to swing from side to side, and the length of stroke of the tyne points is varied by moving the cams in or out from a point directly over the rocking bar. Thus the tyne points can be operated from a stroke of eight inches to three inches, more or less, according to the task in hand.

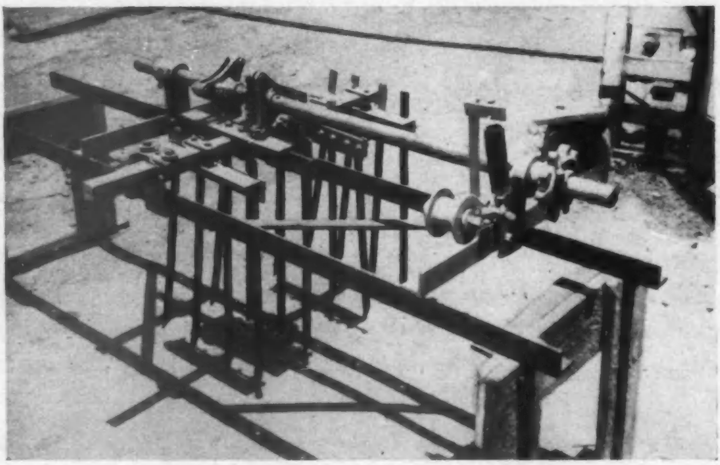


Fig. 1—The triangular cams operate on a plate attached to the same square bar as the tynes.

—Photo: Mackay Executive

The draught is light, and the machine may be operated with the tractor in the higher gear ranges without damage to either tractor, machine or cane. Actually a faster speed is better for operation, although the use of different sized driving sprockets on the machine will allow an increased rate of rocking with a slower tractor speed.

This machine may be used immediately following planting to offset

the effects of unsatisfactory land preparation, which may have produced a lumpy and cloddy seedbed. This condition would prevent the sealing of the cane sett and the subsequent drying out would affect germination. The action of the machine is to break down lumps, and leave a fine friable aeration of surface soil. The soil cover removed is equally distributed on both sides of the sett. Rainfall often produces a lawn of young grass seedlings in plant blocks. The farm operation of smothering with extra cover is unnecessary under such conditions as the action of this machine

Fig. 2—The new Rocking Rakes tyne cultivator should be a useful aid to cultivation on many farms.

—Photo: C. G. Story

tilth as cover on the sett, thus effecting a good seal. The controlled uniform depth of cover resulting from the action of this machine is a further aid to germination.

Heavy rain causing compaction of soil following planting is often a problem in the central area; the Rocking Rakes will remove this cold, compacted soil in the drill and leave the sett cover in a friable condition, thus assisting germination of setts and the is to break up and remove the grass without damaging the cane shoot. The Rocking Rakes are self-cleaning in contrast to normal rakes and cultivation tynes which gather weeds and soil under moist conditions.

The original model of this machine has already demonstrated its capabilities during the 1958 season and the Rocking Rakes have widespread possibilities in the sugar industry as a cultivation implement.

Insecticide Experiments Against Wireworms

By A. A. Matthews

A successful germination is very important to every cane grower as its effect is carried over for at least two and usually three years. Wireworms constitute one of the greatest hazards to germination in the central district and prior to the advent of BHC, growers were forced to plant late as a means of circumventing damage. As a result, the cane often was not sufficiently advanced to withstand a dry spring or an early wet season. Wireworm activity is now regarded as being of minor importance as it is easily controlled by the application of 10 lb. of 20 per cent. BHC dust per acre in the drill at planting. The usual method of applying BHC for wireworm control is with fertilizer, and the recommended rate is 3 cwt. per acre of a planting mixture containing 75 lb. of 20 per cent. BHC per ton or 4½ cwt. per acre of a planting mixture containing 50 lb. of 20 per cent. BHC per ton. This is applied after about half to one inch of soil has been allowed to run in from the sides of the planter to cover the setts. However in recent years some growers have been using a special mixture containing 37½ lb. of 20 per cent. BHC per ton, and instead of using this at 6 cwt. per acre, which would be the correct rate to ensure satisfactory wireworm control, they have adopted the practice of using half this quantity. Although this may provide fully for any plant food requirements, it does not provide adequately for complete wireworm control. These growers have been fortunate in that the wireworm populations have not been very high over recent years, but a heavy and prolonged wet season in 1958 produced conditions suitable for a large increase in wireworms and poor strikes were reported from many fields which were not protected with the recommended dressing of BHC.

Even though BHC gives an effective control of wireworms, the Bureau continues to test the efficacy of promising new insecticides. This is advisable in the interests of economy and also it is good policy not to depend wholly upon one insecticide for control.

Over the last year or so lindane (the gamma isomer of BHC and also the active ingredient of commercial BHC) has dropped in price to such a low level that it can compete satisfactorily on a cost basis with crude BHC. Aldrin was another new insecticide worthy of trial. To test the efficiency of these insecticides, two trials were set out on a farm in the Homebush area, Mackay, using the normal dressing of BHC as a standard, and an untreated control plot to ascertain the severity of the wireworm attack. The following treatments were used in each of the trials :—

(i) 10 lb. of 20 per cent. BHC plus 3 cwt of fertilizer per acre.

(ii) 4 1/6 ozs. of lindane plus 3 cwt. of fertilizer per acre.

(iii) 10 lb. 6 2/5ozs. of 2½ per cent. aldrin plus 3 cwt. of fertilizer per acre.

(iv) No insecticide, but 3 cwt. of fertilizer per acre.

Each insecticide was intimately mixed with Sugar Bureau No. 2 planting mixture. Because BHC was suspected of contributing to some poor germinations and root growth, two application methods were used for each treatment viz. direct and indirect. In the direct method the mixture was placed on the setts in the drill, while in the indirect treatment an inch of cover was placed over the setts before the insecticide—fertilizer mixture was applied. In each trial the treatments

were replicated five times, and an additional replication was established in which setts could be dug up and examined. Unfortunately, when covering the plants, soil which had dried out was unavoidably placed around the setts. This had a bearing on subsequent poor root development as no worthwhile rain fell for several months.

The disadvantage in setting out entomological trials against soil-frequenting pests is the uncertainty whether the desired pests will appear in sufficient numbers to enable satisfactory conclusions to be drawn. Similar wireworm trials have been set out for several years previously, but due to the absence of wireworms, no results could be obtained. Fortunately in 1958, one trial was severely attacked, the control plots suffering severe damage. The other trial in the same farm, however, suffered little damage.

Germination counts were carried out at regular intervals following planting of the two trials. The comparison between the direct and indirect methods of application is best seen in the germination counts made on the trial which was not severely attacked by wireworms (Table I).

This trial was planted on the 8th August, and by the 2nd September there was a big difference in favour of the indirect method of application. Four weeks later the germinations in the various treatments had evened out. The insecticides themselves do not appear to have affected germination and the reason for the slower rate of germination in the direct method of application is apparently due to the close placement of the fertilizer. Further observations in support of this will be discussed later. The trial was planted under dry conditions and the effect of fertilizer placement upon final germination should not be considered typical. If setts were sprayed with a mercurial solution at planting, any fertilizer applied close to the setts would adhere to them and cause fertilizer burn with a resultant poor strike. This has been observed on numerous occasions in the central area.

TABLE I

Treatment	Method of application	Total number of primary shoots per 10 chain of row		
		2/9/58	11/9/58	29/9/58 (Final germination)
Lindane plus fertilizer	Indirect	272	652	918
,, ,, ,, ...	Direct	65	336	901
Aldrin plus fertilizer	Indirect	345	767	983
,, ,, ,, ...	Direct	119	417	931
Crude BHC plus fertilizer	Indirect	342	745	928
,, ,, ,, ,, ...	Direct	61	362	913
Fertilizer, no insecticide (control)	Indirect	240	561	881
,, ,, ,, ...	Direct	50	269	827

The effect of lindane, aldrin and BHC in controlling wireworm damage is illustrated in Table II. These observations were made on the second trial which was subjected to a heavier wireworm infestation.

The low count in the control plot can be attributed to wireworm damage as numerous dead shoots were observed in these plots. The indirect and direct methods of application both gave good control of wireworms,

TABLE II

Treatment	Method of application	Final Germination (Primary shoots per 10 chains of row)
Lindane plus fertilizer	Indirect	792
„ „ „	Direct	864
Aldrin plus fertilizer	Indirect	783
„ „ „	Direct	791
BHC plus fertilizer	Indirect	734
„ „ „	Direct	758
Fertilizer, no insecticide (control)	Indirect	404
„ „ „	Direct	354

but growers can avoid fertilizer burn by applying the fertilizer-insecticide mixture indirectly to the setts. Q.63, a very rapidly germinating variety, was used in each trial. The damage to control plots may have been more severe if a slower germinating variety had been used.

root stubbing and sett root weighings do not support these ideas (See Table III).

The control plots, to which fertilizer only was applied, show a difference in favour of the indirect method of application. This difference was not increased when either BHC,

TABLE III

Treatment	Method of applica-tion	Average weight of roots per internode—oven dried	Total number of nodes examined	Number of nodes showing bad root stubbing
Trial No. 1—				
Lindane plus fertilizer	Indirect	.1688 grams	27	20
„ „ „	Direct	.1005 „	23	21
Aldrin plus fertilizer	Indirect	.0870 „	22	17
„ „ „	Direct	.0601 „	21	21
BHC plus fertilizer	Indirect	.0986 „	25	18
„ „ „	Direct	.0752 „	26	21
Fertilizer, no insecticide (control)	Indirect	.1546 „	24	13
„ „ „	Direct	.0555 „	25	25
Trial No. 2—				
Lindane plus fertilizer	Indirect	.1277 grams	24	17
„ „ „	Direct	.1073 „	28	23
Aldrin plus fertilizer	Indirect	.1610 „	26	18
„ „ „	Direct	.1183 „	28	20
BHC plus fertilizer	Indirect	.1155 „	26	16
„ „ „	Direct	.0721 „	28	27
Fertilizer, no insecticide (control)	Indirect	.1077 „	22	9
„ „ „	Direct	.0909 „	21	16

Growers commonly maintain that for wireworm control the use of BHC at the recommended rate results in excessive root stubbing and slower germination. Random selection of setts from various treatments in both trials together with observations on

lindane or aldrin was added to the fertilizer mixture. It must be stressed, however, that these observations were made on setts which were grown under dry conditions and the results may vary under wet conditions or if a spray were used at the time of planting.

The Bundaberg Ratooning Problem

By R. B. Moller

The area affected by poor ratooning has, overall, remained fairly constant. However, there appears to have been a reduction in the severity of damage and some farms which previously were notorious for ratoon failures of this nature, have this season escaped damage. The relatively few fields ploughed out were mainly harvested during July, when weather conditions were generally unfavourable for satisfactory ratooning.

Soldier fly larvae continue to be found in association with most poor ratoons, but a number of ratoon failures occur in which there is no evidence of insect pests. One hundred soldier fly larvae per stool is not uncommon where infestations occur, while over 300 per stool were recorded in one young third ratoon crop. These larvae vary in size from no more than 2 - 3 mm. up to almost mature size (12 mm.).

In 1958, the adult flies emerged during late April, May and early June. From previous inspections, larval counts indicated that a much larger emergence was anticipated than was actually observed. Maximum fly activity appeared to occur during mid-morning, slackening off towards noon, after which flies were hard to locate. At any one observation site emergence of adults seemed to be concentrated within a period of a few days. Males always seemed to outnumber females, were more active, and were present even after the females had disappeared.

Insecticide trials, using BHC, aldrin, dieldrin and chlordane, have been established on more than 30 acres of land affected by poor ratooning. The trials are either in plant or first ratoon cane. Very little poor ratooning developed in the first ratoon crops of these trials, so no positive results have been obtained in these cases. Examination of stools selected at random in some trials have revealed few soldier fly larvae in either treated or untreated areas. The insecticides concerned were applied to fallow land either as a broadcast dressing disced in just prior to planting or combined with a previous dressing turned under with the final ploughing. Further applications were also made as drill dressings at planting time and at the covering stage.

More recently the presence of fairly large nematode populations has been confirmed both in poor ratooning areas and in other fields where the growth of the plant crop has been poor. Trials with EDB and DD as pre-planting treatments and nemagon as a post-harvest treatment have so far failed to produce any noticeable improvement in growth in these Bundaberg fields.

Margarodids (earth pearls) are fairly widespread and may be potentially dangerous. A trial incorporating aldrin, BHC and chlordane has been established to test this theory.

The possibility of soil microfauna playing a part in this problem has not been overlooked. Microfauna counts are made from samples forwarded to Meringa at regular intervals. These samples are selected from both good and poor ratooning areas and from certain treated areas within trials. To date no conclusions can be drawn from this aspect of the work.

Q.68

By C. G. Story

This variety was developed at the Mackay Sugar Experiment Station from seed of the cross P.O.J.2878 x Co.290 which was planted there in 1946. It was originally selected in mid July, 1947, assigned a "Q" number in 1957 and placed on the approved variety lists for the Mackay and Proserpine mill areas in 1959.

The brix of the original stool was high, being over two units above the standard variety Q.28, while the eight stalks in the stool were of medium thickness (1¼ inches). Its good performance was maintained in the first sett planting, commencing with an excellent germination. The new popular variety at that period, Q.50, was the standard in a later trial planted in July, 1949 and the results were as follows :—

	Plant		1st Ratoon		2nd Ratoon		Totals	
	T.C.P.A.	T.S.P.A.	T.C.P.A.	T.S.P.A.	T.C.P.A.	T.S.P.A.	T.C.P.A.	T.S.P.A.
H.106 (Q.68)	31.44	5.32	28.52	5.24	33.59	5.44	93.35	16.00
Q.50	38.28	6.10	27.53	5.15	32.03	4.96	97.84	16.21
Harvested	Sept., 1950		Sept., 1951		Aug., 1952			
Age	14 months		11½ months		11 months			

Maturity analysis conducted monthly from June to harvest for the three years of this trial showed that Q.68 was superior to Q.50 in the wet year 1950, equal to it in 1951, and again superior in 1952. This advantage in c.c.s. was apparent for both June and July 1950 and 1952. Most varieties will give good sugar in seasons which are conducive to good sugar, but a variety which tends to maintain its superiority under other climatic conditions has an added advantage.

The results of a replicated trial planted on the 30th-31st May, 1951 at Messrs. Butt Bros., Oakenden, on a sandy forest loam, are shown in the following table.

	Plant		1st Ratoon		Totals	
	T.C.P.A.	T.S.P.A.	T.C.P.A.	T.S.P.A.	T.C.P.A.	T.S.P.A.
H.106 (Q.68)	27.16	4.90	29.84	5.21	57.00	10.11
Q.50	29.46	5.10	27.68	4.54	57.12	9.64
Harvested	23rd September, 1952		22nd December, 1953			
Age	16 months		15 months			

Fig. 3—Early growth of Q.68 is uniform and vigorous.

—Photo: C. G. Story

Maturity analysis conducted during 1952 and 1953 further proved the sugar quality of Q.68. It was still one unit ahead of Q.50 at harvest in December, 1953; and it followed the pattern set by both Q.58 and Q.63 of having good sugar early in the season and maintaining its quality until late

Fig. 4—Q.68, approved this year for the central district, is an even cane of medium thickness.

—Photo: J. H. Buzacott

harvest. Maturity analyses conducted until 1957 from various parts of the area confirmed this characteristic of the variety. Its early sugar generally is better than Q.50, but it is practically on a par with Q.58.

The stalk of Q.68 is of a greenish-yellow colour, and is covered with a coating of white wax; however, on long exposure to sunlight, it develops a brownish yellow tint and the wax at times becomes discoloured. The leaf sheath is reddish in colour. This variety has a good flat eye, and it gives an excellent germination. Its growth is vigorous, its cover good, and its habit erect, developing into a good stool. It has a good, even, straight, heavy stalk with a practically cylindrical barrel, tending towards medium thickness (1¼ inches).

Q. 68. ratoons strongly, producing a good crop for both first and second ratoons. It is not a heavy arrower, but when arrowing occurs it is generally late and more prevalent on the clay areas than on the better class lands.

Q.68 does well on coarse, sandy country and it is also suitable for most other soils of the Mackay district—Q.50 and Q.58 type country—but although it produces heavy stalks and remains erect on good land at Finch Hatton, it is generally considered to be too vigorous for the first class alluvial lands. Its vigour allows it to produce good crops on poorer soil types which are unsuitable for growing Q.63.

To date the variety has shown field resistance to red rot. In disease resistance trials it has shown resistance to gumming and downy mildew, tolerance to ratoon stunting, and susceptibility to chlorotic streak, dwarf and mosaic diseases. Throughout various trials its yields, both in cane and sugar per acre, have compared favourably with those of Q.50. Cane growers are advised to make 1959 plantings of Q.68 which will prove a useful addition to their farm varietal programme.

Visitors From South Africa

Fig. 5—Mr. D. R. L. Steindl, on left, shows Dr. G. Cleasby, Mr. J. L. du Toit and Mr. C. H. O. Pearson ratoon stunting symptoms at the Pathology Farm.

—Photo: C. G. Hughes

South Africa Visits Queensland

During April a group of sugar men from the South African industry looked in on Queensland and stayed for nearly three weeks. This delegation of ten was on its way to the International Sugar Technologists Congress in Hawaii and their visit coincided happily with the holding of the Queensland Sugar Technologists Annual Conference in Maryborough.

The delegation* was led by Mr. W. J. C. Barnes, a South African canegrower, who is deputy chairman of the South African Sugar Association and also deputy chairman of the Experiment Station Committee. He was accompanied by Mr. G. C. Flewellen, a prominent canegrower, Mr. C. H. O. Pearson and Mr. J. L. du Toit of the Sugar Experiment-Station staff, Mr. Q. C. Turner and Dr. Cleasby of Tongaat Sugar Co., Mr. Alex Hammond, Editor of the South African Sugar Journal, Dr. Douwes Dekker and Mr. van Hengel of the Milling Research Institute and Mr. Bentley, President of the South African Sugar Technologists' Association.

The firstmentioned seven of this group were interested in agricultural matters and, after the Technologists' Conference in Maryborough, they followed a detailed itinerary as far north as Mossman, which had been arranged by the Bureau. They saw Experiment Station activities, farm implements, field conditions and industry problems at Bundaberg, Mackay, Ayr, Innisfail, Cairns and Mossman, and obtained, in brief, a good cross-sectional knowledge of how our industry operates.

There is much to be said in favour of such an international visit. There were many opportunities for discussion on problems common to both countries, and for debate of practices which do not follow parallel lines. Although South Africa is vitally interested in mechanical harvesting of cane, we learnt how difficult is their problem on steep land where cane must be cut green. Similarly we now have a better appreciation of why they insist on cutting green and conserving all trash as a blanket.

With a 36 inch annual rainfall and a two-year crop, perhaps their cane breeding problem is a more difficult one than is ours; but we have reason to remember that our Southern area —with a 43-inch rainfall—has been regenerated by specially selected cane varieties.

We have little doubt that this large delegation from another Empire sugar producing country will have seen much to interest them in their travels through our lengthy sugar belt. Their production is almost as large as our own—and is still growing—and they are in a position to apply any knowledge gained here towards improving their own output.

Coming from an area of such low annual rainfall, the South African representatives were impressed by the growing conditions in our high rainfall districts in the north, and by the bounteous supplies of subterranean water in the Lower Burdekin delta. Irrigation is extending slowly in South Africa where coastal river water is being utilised for watering crops. The very hilly contours necessitate the use of large revolving spray units, and that method assists in making better use of the limited water available.

N.J.K.

* See photograph in pictorial section.

The Sugar Surplus — Its Cause and a Possible Remedy

A broadcast over the A.B.C. network.

By Norman J. King

The sugar industry in Queensland would appear to have arrived at an impasse! How else would one describe a position where, on the one hand, field efficiency is increasing and the production from each acre rising and, on the other, a restricted market limits the saleable production?

If one looks on the sugar industry as an agricultural undertaking it is found that much the same acreage is harvested each year except when planned expansion is permitted to fulfil a growing market such, for example, as an increase in Australian population. I mention this to indicate that the rising production of sugar cane is not the result of much larger the result of better farm husbandry— areas being farmed. It is almost solely the result of translating technical advances into farm practice.

But unlike most other forms of farming endeavour where a perishable product has to be marketed rapidly— whether it be directly to the consumer, the cannery or to cold storage —sugar cane is not a consumer product. It has to be processed to make raw sugar, and it is raw sugar which the industry has to sell to Australian and overseas refineries. It is this raw sugar market which limits the tonnage of sugar cane which may be processed in any one year and, if the market is limited—as it is by Australian requirements and by International Sugar Agreement—the sugar mills cannot accept more than a specific tonnage of sugar cane, irrespective of what surplus may be produced.

The last twelve or fifteen years have witnessed a march of progress in production which is by no means halted at the present time. Rather are there signs that research is just getting into its stride and that we may expect just as important advances in the future. Sugar scientists who speak to-day of another twenty per cent. increase in production on the same area are not indulging in flights of fancy. Even our existing cane varieties can be made to do this with more plant food and water. But we desire to prevent our crops from falling over, and more intensive agriculture, though producing more cane, would result in recumbent crops with higher harvesting costs. And, of course, any appreciable increase in production would have to be accompanied by a complementary market.

So, before we deliberately aim at higher production per acre we need to breed a selection of lodging resistant canes which have the inherent capacity to remain erect even with heavy crops under adverse field conditions. Already some such canes are available and are being grown commercially on very rich soils. It may not be long before a much larger number is in the hands of the growers.

One may reasonably ask why efforts should be made to raise existing standards when overproduction is already a problem of some magnitude. The answer lies in the all-important matter of costs. While the post-war cost spiral has raised the price of most consumer goods fourfold, refined sugar has increased only two and a half fold and it is the aim and wish of the industry to keep the sugar price down by raising its efficiency standards and reducing its cost of production. It follows automatically that if, by reason of technical advances, more sugar can be produced on the same area, the saving per acre

will help to offset higher wages and expenses on the farms and in the mills. If, for the time being, more sugar cane is grown in that way than can be sold, then productive acreage can be cut down; but efficiency should not be lowered.

The whole story of this improved husbandry on sugar cane farms can be condensed into the few words — research results, good extension services, and translation into commercial practice. Once it was discovered how the major diseases were spread it was much easier, through extension staff, to control and eradicate them. Then, with the knowledge that resistant varieties could be bred the cane breeders produced and distributed a wide range of suitable types.

The discovery of a cheap and effective insecticide to control cane grubs and wireworms was rapidly translated into a simple application method and the soil became a hazardous place for these pests to forage in. Each year about £150,000 is spent by cane growers on this insecticide, but the crop savings are nearer to £600,000.

Queensland bred cane varieties have increased, and are continuing to increase, the production on even the oldest of our sugar cane soils. In one of the large cane producing districts where the sugar produced is worth £13,000,000, the breeding of one new and improved variety, Q.50, has meant an extra £4.5 million annually to the growers and millers of the area. This cane variety raised the production by over twenty-five per cent. in a short few years.

Publicity is sometimes given to statements by agricultural authorities that primary producers are too slow in implementing the results of research on their farms. Leaders in the sugar industry can make no such complaints. Any new advance, whether it be in fertilizing, weed control, cane varieties or destruction of pests, is avidly accepted. Maybe this is a result of the high degree of organization of farming groups throughout the industry, but much of the explanation lies in the good extension service between research units and the growers, and to the local publicity given to scientific advances on the experiment stations.

All in all, the sugar industry's progress up the efficiency ladder has now placed it second to Hawaii in yields of sugar per acre per month. I use this term because different countries harvest crops of varying age and it is difficult to compare their relative efficiencies if any other yardstick is used. But there is no complacency about this achievement and the retention of such a position can be assured only by maintaining the present high standard of research. Indeed, it will probably be necessary to improve on it.

The impasse which we have reached, and which I mentioned in the first words of this talk, is that, at the moment, we are growing more sugar than we can dispose of. Naturally the industry does not take kindly to a restriction of production—no industry does. But, what is the solution? People speak glibly of finding other uses for sugar additional to its use as a sweetener in food, drinks, ice creams, etc. But that is a lot more difficult than it sounds. Sucrochemistry, or the chemistry of sugar products, is in its infancy and maybe, in the years to come, a great new industry may emerge as happened with petrochemistry as we now call the industrial development which has evolved from the petroleum industry. For the present, however, there are no major uses for sugar except as a food, and we must keep in mind that any new use must be a major one if it is to absorb even an appreciable part of the surplus which the world can now grow.

Rather jokingly I was asked recently why we could not produce a good whisky by fermenting and distilling sugar juices. Well, let us think about it. Even if such a product could

be made, the entire whisky consumption of Australia would be covered by the fermentation and distilling of less than 4,000 tons of sugar—a mere drop in the bucket considering that Queensland's overproduction of sugar cane last year was the equivalent of 100,000 tons of sugar.

The Sugar Research Foundation in the United States is spending a lot of money seeking a break-through into an important chemical industry. Quite a lot has been achieved, but there is much to be done. At the moment the favoured product is a sugar based detergent which has a lot of promise if the economics of production are sound. The job of creating a sucrochemistry industry is not insuperable, but it cannot be completed overnight. Both brains and money and maybe a lot of good luck are essential ingredients. After all we have a product which is both pure and cheap; what other pure organic chemical can be retailed at ten pence a pound? This is a good basis for a chemical industry—one which may, in time, make an important contribution to Australia's industrialisation.

Warning on Leaf Scald

Leaf scald is one of the more serious diseases of sugar cane occurring in the wet tropical belt from Townsville to Mossman, and can cause serious losses of cane in susceptible varieties throughout this area, particularly in low-lying localities.

Typical symptoms of the disease consist of creamy white leaf streaks running parallel with the veins and broadening into dead tissue at the edge of the leaf. Fine white "pencil lines" are usually seen within these streaks. Frequently the whole top becomes more or less chlorotic, the stalks become stunted and much side-shooting occurs. Many shoots either die out or fail to make millable cane.

Clark's Seedling, Q.44, Q.64 and Q.66 are very susceptible to leaf scald, while Q.57, Trojan and Vidar are somewhat less susceptible. Every possible care should be exercised to keep all varieties free from the disease, otherwise valuable special purpose varieties such as Q.66 may have to be banned. The fact that symptoms may be masked for long periods, particularly in varieties such as Trojan, makes the task of controlling this disease more difficult; however, the continual selection of clean planting material and the ploughing out of diseased fields after the second ratoon, will keep the disease under control.

The disease is readily spread by the cutting knife, either during planting or harvesting operations. It therefore follows that each time a diseased crop is ratooned the disease is spread to more stools, and for this reason diseased crops should not be grown for long periods.

Proclamations issued in respect of these areas prohibit the use of diseased planting material and the growing of diseased cane beyond the second ratoon crop. In spite of this, some growers have continued to grow diseased cane after this period, but such growers have been served with plough-out orders and the mills concerned have been notified not to accept this cane for milling. More stringent measures may be adopted in future against growers who illegally grow leaf-scald diseased blocks beyond the second ratoon. If a grower is in any doubt whatsoever regarding his obligations in this respect he should consult either the local Bureau officer or the Supervisor of his Cane Pest and Disease Control Board.

D.R.L.S.

Fig. 6—The South African delegation arriving at Eagle Farm Airport, Brisbane. They were met by representatives of the Queensland industry.

Back row—Messrs. J. L. du Toit, A. van Hengel, W. J. C. Barnes, Dr. G. Cleasby, C. H. O. Pearson.

Front row—Messrs. R. J. S. Muir, G. C. Flewellyn, A. G. Hammond, Dr. K. Douwes Dekker, Mrs. Douwes Dekker, Mrs. Barnes, Miss J. Stacey, J. P. N. Bentley, Q. C. Turner, F. Robert (Mauritius), Norman J. King.

—Photo: K. Blyth

Fig. 7—The Teddington Weir outside Maryborough which provides that city with its water supply.

—Photo: J. H. Buzacott

Fig. 8—Sugar lands of the Moreton mill area on both sides of the Maroochy River.
—Photo: Department Agriculture and Stock

Fig. 9—A view of the Moreton sugar mill at Nambour.
—Photo: Department Agriculture and Stock

Fig. 10—The last cane to be punted from the area which will now be served by the new bridge at Bli Bli in the Moreton district.

—Photo: C. L. Toohey

Fig. 11—Mt. Ninderry overlooks some of the Moreton district sugar lands.

—Photo: Department Agriculture and Stock

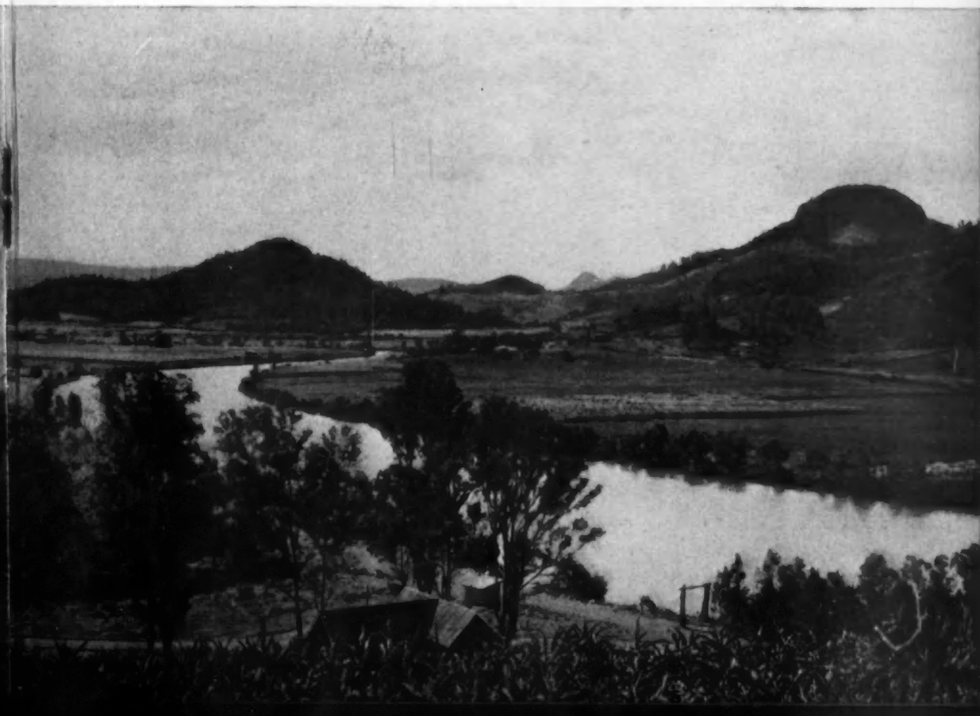


Fig. 12—Illustrating one of the hazards associated with aerial spraying in a Queensland sugar cane area.

—Photo: I. J. Stewart

Fig. 13—A large four-row cane planter in use at Fairymead plantation, Bundaberg.

—Photo: C. G. Hughes

Q.66 in the Mulgrave Area

By P. Volp

(Supervisor, Mulgrave Cane Pest and Disease Control Board)

Prior to the approval in 1957 of the variety Q.66, the Mulgrave area had a choice of varieties suitable for the various types of medium and poor soils, but none which was suited to the rich river flats. On the rich soils, varieties such as Trojan, Badila and Pindar grow prolifically but lodge badly and usually produce a crop of very low sugar content. The lodging introduces harvesting difficulties and adds considerably to the cost of cutting.

The new variety, Q.66, strongly resists lodging, and although not completely immune to lodging, it produces a reasonable sugar content; so it is not surprising that it has become very popular in the two years for which it has been approved. Unfortunately Q.66 is highly susceptible to several diseases which flourish on the class of land to which this variety is particularly suited. These include the important older diseases, leaf scald and chlorotic streak, and the more recently discovered bacterial mottle. In consequence, Pest and Disease Control Board Supervisors have to exert constant vigilance in respect of plantings of Q.66.

Despite its susceptibility to disease, the placing of Q.66 on the list of approved varieties has been fully justified. During 1958 some 12,864 tons of it were harvested in Mulgrave alone for a seasonal average of 14.62 c.c.s., compared with the mill average of 14.02. This crop was harvested from 337 acres giving an average tonnage of 38 tons per acre. Although this average tonnage might not seem high for a rich land cane, it must be realized that a proportion of the crop was grown for plants on high land where the variety crops lightly.

Over the whole period of the 1958 crushing, harvesting costs for Q.66 were almost all at schedule rates and its lodging resistance was particularly noticeable in low fields which were planted partly to Q.66 and partly to other varieties. In many of these instances only the Q.66 was standing whilst the balance of the field was badly lodged. During the 1958 rainy season flooding of the Mulgrave river flats was extensive and although some fields were completely submerged there was very little loss in Q.66 when compared with other varieties growing under similar conditions.

Late spring and early summer inspections of Q.66 fields showed that chlorotic streak was well established in all fields which received flood waters and some stools were found infected with bacterial mottle. Likewise leaf scald was located in a number of fields. It is obvious, therefore, that careful and thorough inspection of all sources of planting material must be made in order that the incidence of disease in the various plantings of Q.66 will not constitute a threat both to itself and to other varieties. However the following advantages of the variety when grown on rich soil show that it is worth the effort to retain it as an approved variety :—

1. Its erect habit, anti-lodging qualities and low harvesting cost.
2. Its quick and good germination, good stooling and rapid growth which give good weed control.
3. Its sugar content which is definitely higher than that of Badila, Trojan or Pindar when grown on comparable rich land.

Some Aspects of Legume Crop Disposal

By A. G. Barrie

The practice of growing a green manure crop in rotation with sugar cane is well established in Queensland. The two main crops grown are cowpeas and velvet beans, both of which are legumes. These are planted after the ratoons are ploughed out late in the year and are allowed to grow during the wet summer, and are incorporated into the soil after a growing period of from four to six months. The legume crop has two functions during the growing period. By giving a continuous cover it suppresses weed growth and helps to diminish the weed problem in the subsequent cane crop. The prevention of erosion is also a function of the legume crop. Heavy rain invariably falls during this period and if a bare fallow were maintained the soil would suffer greatly from erosion. However, the alternative to a legume crop is usually not a bare fallow, but a weed and grass crop and this may be just as effective in preventing erosion as the legume crop.

The benefits derived from adding the legume to the soil are not well defined and very little precise information is available. However, there are general principles on the subject and these can be used as a guide for the disposal of the legume crop in the most profitable way.

When the legume crop is incorporated into the soil, it is decomposed by micro organisms (bacteria and fungi) in the soil. There are a number of factors which affect the rate and extent to which plant material is decomposed.

1. The dispersal of the crop through the soil.
2. The moisture content of the soil.
3. The temperature of the soil.
4. Aeration of the soil.
5. The nature of the crop.

The first four factors can be explained sufficiently by stating that decomposition is most rapid if the crop is finely divided and dispersed through warm, moist, well-aerated soil. The fifth factor is somewhat more complex.

The nature of the crop has a great influence on the results to be obtained from the green manure crop. Two types of crop may be distinguished and these will be dealt with separately.

The green manure crops normally grown in the sugar industry are high in nitrogen and relatively low in carbohydrate. Such crops would be young, lush, vigorous growing legumes in which there would be an abundance of green leaves and small proportion of fibrous stems. When this crop is incorporated into soil, the decomposition would be very rapid and complete. The carbohydrate would be decomposed to the gas - carbon dioxide - and water. Nitrogen would be liberated in the form of ammonia which is immediately fixed by the soil. However, some of this nitrogen is ultimately converted to nitrate which can be leached out of the soil. There would be no permanent build up of humus, but there would be an increase in available nitrogen. In some instances a slight decrease in the humus content of the soil has been found. The explanation of this is that the decomposition of the lush crop stimulates the mocrobial activity in the soil to such an extent that some of the more resistant humus already present in the soil is attacked and decomposed also. Because of the nature of the green manure crop in Queensland, its major role is to increase the level of available nitrogen in the soil and this should be kept in mind when valuating methods of disposing of the crop.

In addition, other minerals such as phosphorus and potassium are liberated to the soil as the crop decomposes. Some green manure crops are able to utilize fairly unavailable forms of phosphorus and when the plant is decomposed it is liberated in a more available form which can be used by the next crop. Whether cowpeas and velvet beans are able to utilize such unavailable forms is not known.

When to dispose of the legume crop :

There are a number of factors which have to be kept in mind in making a decision of when to dispose of the legume crop.

(1) *Soil moisture.*

While a green crop continues to grow it is depleting the soil moisture and considerably more is lost by transpiration from such a crop than by evaporation from bare ground. Good moisture is essential for planting the cane crop, so it is advisable that the legume crop be destroyed while the moisture is still high. Otherwise the germination of the succeeding cane crop may suffer from moisture deficiency.

(2) *Adverse effect on germination.*

When the legume crop is destroyed, the initial rate of decomposition is very rapid and it is generally recommended that the cane crops should not be planted during this period because of possible adverse effects on germination. Decomposition tests in the laboratory, carried out by Bureau chemists some years ago, indicated that the decomposition rate was very rapid for the first 10-15 days after application of cowpea material to the soil and then gradually slowed down. A period of at least a fortnight and preferably longer, depending on the nature of the crop, should be allowed to elapse between disposal of the legume crop and planting.

(3) *Loss of nitrogen through leaching.*

On the other hand the legume crop should not be disposed of too early. As has been shown above, nitrogen is the main product from the decomposed legume crop and, in its final form as nitrate, it is soluble in water. If heavy rain falls after the nitrogen has been converted to nitrate, there is a danger that it will be lost through leaching.

From consideration of the factors (1) and (3), it will readily be seen that no hard and fast rules can be laid down as to when to dispose of the crop. It is a matter of decision for each individual farmer. It will depend on local soil and climatic conditions and an estimate, usually based on years of experience, of what the future weather pattern is most likely to be.

Methods of disposing of the legume crop :

Two methods of disposing of the legume crop are commonly practised. These are discing prior to ploughing, or ploughing it in directly. In the former method the crop is only partly under the surface of the soil. Decomposition takes place both on the surface of the soil and below it. It seems reasonable that some of the nitrogen liberated from the crop *on the surface* of the soil would be lost, as it would be in the form of a gas, ammonia. The magnitude of such losses is not known. The nitrogen liberated from the crop *in the soil* would be trapped by the soil and not lost until it is converted to the nitrate form.

Decomposition would probably be more rapid by the discing method because the crop would be more finely divided and dispersed through the soil, and aeration would also probably be better.

A factor in favour of discing rather than ploughing is that the rotting material on the surface of the soil would help prevent compaction of the soil and erosion if heavy rain fell soon after disposal of the crop.

Over-production! Why More Research?

By Norman J. King

The experience of the last few years should be a clear signpost to thinking canegrowers that over-production is a problem to be faced squarely—and one which will not be limited to 1958.

It's an unpalatable fact, but a fact nonetheless, that we have reached a stage in the industry where surpluses are likely to be commonplace. Admittedly 1958 was a year of good production; all districts had good crops. But Mackay had two serious floods and the Lower Burdekin had one — so the crop could have been bigger. In addition, the growing season in the Northern areas was late in starting after the dry spring and early summer of 1957.

Some may argue that one of South Queensland's recurring droughts could change the picture, but that is unlikely. The Southern district produces —in a good year—only a small proportion of the Queensland crop and, even with the disastrous drought of 1957 in that area, the total State crop was still above the peak. Improved cane varieties which are tolerant of dry conditions, combined with a spread of irrigation over district farms, have given a greater degree of stability to that climatically unpredictable district.

No, the previous ups and downs of most districts are fast disappearing and stability of production is a goal which is becoming closer year by year. But accompanying the stability which should be welcomed by any primary producer is the problem of over-production. Because, so long as the existing assigned acreage is farmed, planted and harvested, the increases in yield caused by new varieties, destruction of pests and control of diseases will result in too much cane being produced.

The bald fact is that field efficiency has advanced more rapidly than our markets have grown, and we have to face up to a surplus production problem in, maybe, three years out of five—if not more frequently. How to solve that problem is a matter only the growers can decide. Some are fertilizing less generously, others irrigating less frequently, and still more are planting lesser areas but maintaining efficiency standards. Each grower will doubtless tackle the problem in his own way and be guided by the local conditions of his area.

The paradox is that, even at such a time, the requests for new and better varieties, for new weedicides and for improved fertilizers are not diminishing. In fact there are new pressures to intensify the varietal search in several districts—at a time when the selfsame districts are producing more cane than they can harvest. What is the reason for this state of affairs?

In some cases the reason is obscure, except that the requests spring from a reluctance to be satisfied with existing standards of efficiency. In others the basic desire is to solve a particular problem, whether it be the raising of sugar content in the wet districts or the finding of drought-resistant canes for parts of the South.

Doubtless time, and the intensification of effort, can solve these problems and each solution will contribute to the production of even more sugar unless the areas so benefited are prepared to balance higher production with reduced acreage.

There are sound, fundamental reasons for continuing research even in the face of an over-supplied market. In the first place we cannot foresee the markets of the future and it is necessary to plan for higher output so that the industry will possess

the ability to expand if and when it becomes essential. Secondly, we must recognise that several of our districts have almost reached the limits of acreage expansion, and that future growth will be possible only by higher efficiency. Thirdly, some of the areas in the wet belt, although producing their peak requirements at present, are doing so inefficiently because of low sugar content of cane. In these districts a new range of varieties of higher sugar content could reduce cost of production by cutting down harvesting and transport charges.

Research has done a great deal in the past to eliminate or control such hazards as crop-destroying diseases and pests, and to produce canes which produce economically under dry or flooded or frosty conditions. It is much more difficult to combat the depredations of cyclones but, even there, a ray of hope has come with the breeding of lodging resistant canes and ones which are not snapped off by high velocity winds.

Much has been done and much remains to be done; and, even in this over-production period, progress will be made. If markets do not expand simultaneously with such progress, then the results of research must be applied on a reducing acreage. It would be anomalous for the industry to press for, and pay for, intensified effort if it attempted to solve the resulting over-production by reducing efficiency standards on the same acreage.

A Visitor From Mauritius

Fig. 14—Mr. F. Robert from Mauritius visited Queensland before the I.S.S.C.T. Congress. He had many questions to ask Mr. Ben Anderson at Bundaberg.

—Photo: C. G. Hughes

Nitrogen—From a Green Manure Crop

By L. G. Vallance

In the October, 1958 issue of this Bulletin it was pointed out that, while the application of nitrogen was necessary to most cane crops, top dressing with sulphate of ammonia could quite easily become an uneconomic proposition unless careful consideration was given to the amount applied. This is particularly the case in plant cane especially when a good green manure crop is turned in prior to planting. Further proof of this was given by a trial recently harvested on Mr. J. A. Chapman's property, Homebush, Mackay, where it was shown that a green manure crop could supply sufficient nitrogen to increase the cane yield by nearly seven tons per acre.

The experiment was set out to obtain some information on the value of cover cropping in this type of country, which is fairly typical of much of the Mackay district. The field was divided into eighteen plots. On nine of these a mixture of Reeves cowpea and velvet bean was planted in October, 1956. This produced a very good cover and it was ploughed in shortly after the wet season early in 1957. All the plots were then planted to Q.50 at the end of April, using as a planting fertilizer a uniform application of Sugar Bureau No. 2 Planting Mixture. The cane crop was harvested in October, 1958.

The plots on which no green manure had been grown and which were not top dressed with sulphate of ammonia averaged 29½ tons of cane per acre, while similar plots which had been green manured yielded approximately 36½ tons per acre. The difference of seven tons was obviously due to the beneficial effect of the cover crop.

In order to see whether the cane yield could be further increased by applying a top dressing in addition to the green manure, some of the plots received a dressing of 1½ cwt. of sulphate of ammonia per acre and others received 3 cwt. However no further increase in yield was obtained from either of these amounts and it seemed apparent in this particular case that the mixed cowpea and velvet bean crop was capable of supplying all the nitrogen that was required.

Treatment	Tons per acre	
	Cane	Sugar
1. No green manure—no sulphate of ammonia	29½	5.3
2. Green manure—no sulphate of ammonia	36½	6.5
3. Green manure plus 1½ cwt. sulphate of ammonia	36¼	6.6
4. Green manure plus 3 cwt. sulphate of ammonia	37¾	6.7
5. 1½ cwt. sulphate of ammonia—no green manure	36¾	6.6
6. 3 cwt. sulphate of ammonia—no green manure	35	6.4

As a matter of interest the yields of cane and sugar per acre for the six different treatments are shown in the accompanying table. The small differences in yields between treatments 2 and 6 are due to plot variations and not to the effect of the various treatments.

Effect on c.c.s.

In this trial, samples of cane were taken from all plots at harvest for c.c.s. analysis. This was also done in August, i.e. two months before the cane was cut. At neither of these two sampling dates was there any evidence that the application of nitrogen, either from the green manure crop or from the sulphate of ammonia top dressing, had any definite effect on c.c.s.

The Conference Period

By Norman J. King

At the time of writing, the various organizations within the industry, the growers, millers, chemists, engineers, supervisors of pest and disease boards and research workers have completed the annual conferences which are convened during March and April of each year.

It is at these gatherings that the industry representatives, in many fields of endeavour, discuss their problems, disclose the research results obtained in the previous year and, in general, assess progress in this large and complex industry.

Sugar is now Queensland's largest primary industry and its interests are so diverse and its problems so varied that annual conferences have become essential as a clearing house for discussion and information. It is a large employer of labour; it is an important user of roads, railways, shipping, electricity and water supply; it is concerned with the marketing of over sixty million pounds worth of its raw product; it is vitally concerned with the costs and availability of machinery, oil, petrol, steel, spare parts, and food supplies; its very livelihood is dependent on fertilizer and on pest and disease control; and its future is bound up in maintaining its technical efficiency at as high a level as that in other countries.

It is only natural that outspoken individuals in such a large and widespread undertaking should sometimes question the need for so many annual conferences. But the results obtained from discussion of grievances and suggestions appear to justify the continuation of the annual meetings. Many resolutions which may be parochial in outlook naturally may not get beyond the discussion stage, but others of an overall value to the progress of the industry are followed up with vigour and implemented where practicable.

The research conferences have a specialised value. It is at such gatherings as the Queensland Society of Sugar Cane Technologists and the Cane Pest and Disease Control Boards that work is discussed dealing with technical developments. New practices in milling and manufacture, improved processes for treating juices and recovering sugar, more vigorous and sweeter cane varieties which have been bred, and better implements for farm operations are brought to light. Similarly the latest developments in insect and disease control are explained and debated.

In 1959 there is also the triennial meeting of the International Sugar Technologists' Society which is to be held in Hawaii during May. A delegation will proceed from Queensland — at present numbering 24 — representing millers, growers, Sugar Research Ltd., the University of Queensland, the Bureau, the Cane Growers' Council, the Australian Sugar Producers' Association and the Central Cane Prices Board. The overseas contacts at such a Congress are invaluable. The standard of contributed papers at such a Congress is high but, what is equally important, a worker in one field can meet and talk to his counterpart from another country and frequently get a lead on the problem he is tackling at home.

Such international contacts have resulted in many improvements in our industry, in both field and factory. And one important thing we can still learn from other sugar industries of the world is the exploitation of our bagasse surplus. Doubtless on the occasion of the 1959 Hawaiian Congress our delegates will interest themselves in Hawaii's research into bagasse usage for making commercial products.

Wallabies Damaging Cane in the Mulgrave Area

By G. Wilson

In the Mulgrave area the weather was very dry from July until mid-December in 1958, and, as commonly occurs under such circumstances, wallabies came into the cane fields seeking green feed when the supply of native grass was depleted. Some observations made on one farm in November, 1958, when the cane foliage varied from 12 to 18 inches in height are of interest. In cane of that size the wallabies usually bite off the upper, inner, leaves and may pull out the central spindle. In this instance, however, the wallabies attacked the lower portion of each cane shoot, where it was enclosed in the leaf sheaths. The leaf sheaths were bitten through and the inner tissue in the vicinity of, and including, the growing point was eaten. The size of the cane was such that the shoots were completely or partially severed almost at ground level and none of the damaged shoots was left standing. The weather was extremely hot and dry, and the soil was very dry and a probable explanation for the mode of feeding is that the animals were seeking, and found, a higher moisture content in the inner tissue than in the wilting foliage.

The wallabies showed a decided varietal preference. In a field of plant cane, at the point where the wallabies entered the cultivation, they had available a few rows of Q.59 and of Co. 475, adjoining Pindar, which comprised the major portion of the field. Every stool of Co. 475 was completely reduced to ground level for some distance along the rows, while the adjoining Pindar was not damaged. A few single stools of Pindar growing amongst the Co. 475 were passed by without damage. The Q.59 was attacked only to a minor extent. In a field of ratoons the ends of the rows of Q.44 and of Pindar abutted on the headland at the point of entry. The wallabies fed progressively along the rows of Q.44 for a considerable distance in preference to attacking the Pindar near the point of entry.

The suggestion had been made that meatworks fertilizer applied on the foliage acted as a deterrent to wallabies. Recently manufactured meatworks fertilizer was applied at the rate of about 200 lb. per acre on the foliage around the hour of 6.0 a.m. when dew was present to make it adhere to the leaves. It was noted at 6.30 a.m. that the rising temperature had then caused the film of dew to agglomerate into large drops, and at 6.45 a.m. the leaves were quite dry. The treatment was applied in a band almost a chain wide across the ends of the rows, and along six rows on one side, and four rows on the other side, of the affected area. Inspections made up to four days after the treatment showed that the wallabies fed on the cane surrounded by the treatment, and even on the treated rows.

Two New Seedling Plots

Cane growers in the Tully and Isis areas will be pleased to hear that the Bureau will this year be establishing seedling plots in those districts. The climatic and soil peculiarities of the Isis district are sufficiently different from those in Bundaberg to justify growing and selecting new seedling canes in the Isis environment; and it is hoped that the new method will result in a supply of canes better suited to that district.

Similarly, it may be practicable to select in Tully a range of varieties with special attributes for that wet, cloudy area. N.J.K.

Progress with Mourilyan Harbour for Bulk Loading

By S. O. Skinner

The development of Mourilyan Harbour, the fifth port in Queensland at which bulk handling facilities for sugar are being installed, is proceeding steadily. The accompanying photograph taken early in 1959, shows the formative stage of the work.

Fig. 15—Earth moving is on a grand scale for the Mourilyan Harbour bulk sugar installation. The Harbour is to the left.

—Photo: S. O. Skinner

The development entails two distinct operations, namely :

(a) The preparation of the site for buildings.

(b) The underwater blasting of the harbour entrance.

Mourilyan harbour, which has to date been used for the disposal of bagged sugar by lighter and coastal shipping, is picturesquely locked by mountainous spurs which run down to the water's edge. With space so restricted, the development for the buildings necessitated a very extensive earth cut, and levelling, as may be seen from the photograph. On the right of the road is to be located the bulk shed of some 1000 feet by 150 feet dimensions and, on the left, the rail and road receiving yards.

The deepening and widening of the entrance entails drilling and blasting in up to 30 feet of water to give a final clearance to shipping at low tide of 30 feet. The task is being made difficult by the rugged nature of the sea bed at the entrance where rock pinnacles exist, the exceptionally strong rip peculiar to the harbour, and the hardness of the water worn rock. The work is performed from a drilling barge, and placing the charges in the borings under the difficult circumstances has not been without attendant problems.

The drillings are being made at five feet intervals on the square, and up to 12 borings are detonated simultaneously. In all some 6000 borings have to be made which will cover a sea bed area, in the land dweller's vocabulary, of some three acres.

Conference of Cane Pest and Disease Control Boards at Cairns

By C. G. Hughes

The 1959 Conference of the Cane Pest and Disease Control Boards was held on 8th April in the Council Chamber at Cairns, North Queensland. The gathering of 88 delegates, observers and Sugar Bureau officers comfortably filled the handsome, cedar-panelled room, when it was called to order by Mr. Norman J. King, Director of the Bureau of Sugar Experiment Stations. He welcomed the delegates on behalf of the Honourable the Minister for Agriculture and Stock and then called for nominations for Chairman of the Conference. Mr. J. R. Warner, Chairman of the Mulgrave Cane Pest and Disease Control Board, was elected to the chair and the business of the Conference commenced immediately.

Fig. 16—Bacterial mottle on an alluvial flat at Mossman interested delegates to the Cane Pest and Disease Control Board Conference.

—Photo: J. H. Buzacott

Delegates at the Conference included representatives from every Board and it was pleasing indeed that the more distant, such as Rocky Point, Moreton and Maryborough, were represented. The roll call showed that there were 37 Board members and 20 supervisors present, so that both the administrative and the field staffs of the Boards were well represented.

There were nine papers, six on pests and three on diseases, presented to the Conference. Mr. A. A. Matthews described the use of a carbide gun for scaring white cockatoos away from cane in the Proserpine area. He also mentioned that the birds favoured some varieties more than others. The important Q.50, for instance, was one of the most severely attacked. He suggested that it might be a sound proposition to ring a field of Q.50 with varieties which are less attractive, since normally the birds come into a standing crop from the edges. Mr. G. A. Christie tried a carbide gun in the hope of preventing damage to cane by wallabies and coots in the

Giru area during the dry weather in the latter half of 1958. However, the animals quickly got used to the explosions and their feeding was interrupted for only brief periods at each discharge. The wallabies showed a marked preference for Q.50 where Pindar, Q.58, Q.63 and Trojan were also available. Wallaby damage during drought periods was also discussed by Mr. G. Wilson. He noted an unusual method of feeding in which the actual growing point and other young tissue of the small cane plants were eaten at ground level. Co. 475 and Q.44 were preferred to Pindar.

The results from two fertilizer plus insecticide trials against wireworm in the Mackay district were discussed by Mr. A. A. Matthews. They showed that, even without the incorporation of any insecticide, fertilizer will severely affect germination when applied in contact with the sett. Aldrin and lindane were at least as effective in controlling wireworms as the standard 20 per cent. benzene hexachloride. The difficulties encountered in testing insecticides against grubs damaging sugar cane were highlighted by the experiences of Mr. N. McD. Smith in the Bundaberg-Isis district. There, the grubs mostly responsible are those of the Bundaberg and Childers beetles, and an extensive series of trials with BHC, aldrin, dieldrin and chlordane has not yet yielded any conclusive results. Mr. R. B. Moller, in a short paper on the Bundaberg ratooning problem, mentioned that soldier-fly larvae are sometimes found associated with the failures, but other factors are certainly involved.

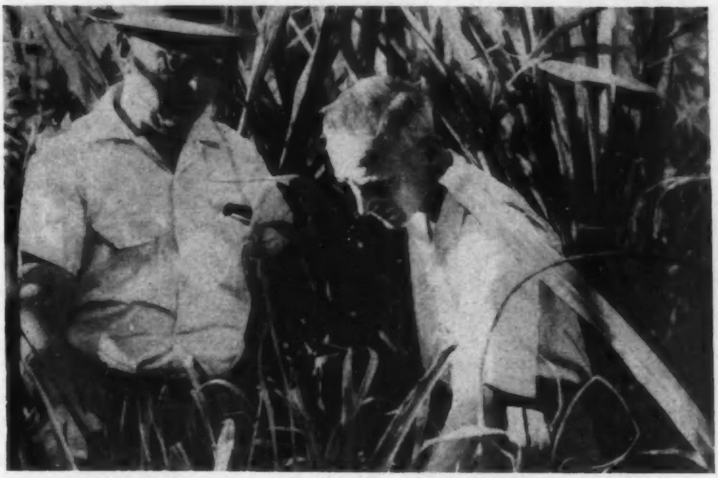


Fig. 17—Mr. P. Volp, Mulgrave Cane Pest and Disease Control Board supervisor, shows leaf scald to Mr. F. W. Heck, a delegate from Rocky Point.

—Photo: C. G. Hughes

Mr. R. H. Farquhar of the Victoria Cane Pest and Disease Control Board gave a further report on the hot-water treatment of canes in the stalk. Some 243 tons were thus treated at Victoria during 1958 and the germinations obtained, with only three exceptions, which could be blamed on other factors, were quite satisfactory. Seven batches, each receiving the three-hour treatment, were handled each 24 hours during the height of the season. Mr. B. T. Egan's review of the hot-water treatment programme

showed the work that has been done by the Boards at Mossman, Hambledon, Mulgrave and Babinda in their efforts to provide planting material as free as possible from ratoon stunting disease. Mr. P. Volp's paper on Q.66 in the Mulgrave area led to an interesting discussion as to the economics of releasing a very disease-susceptible cane when it would certainly provide some years of profit before it had eventually to be discarded.

Business matters considered after the papers had been discussed included, amongst other items, resolutions that canegrowers and secretaries of Cane Pest and Disease Control Boards be allowed to attend Conference as observers. These were passed as was also the request that the 1960 Conference be held at Ingham.

Host Boards for the Conference at Cairns were Mossman, Hambledon and Mulgrave, and both the social functions and the day-long 'bus trip to Mossman mill and fields, to diseased fields at Mulgrave and to the Meringa Experiment Station, were noted as very enjoyable additions to the deliberations of the Conference itself.

A Pathologist from Overseas

Fig. 18—Mr. R. Antoine, pathologist of the Mauritius Sugar Industry Research Institute, in earnest discussion with Mr. C. G. Hughes on ratoon stunting.

—Photo: D. R. L. Steindl

Insecticidal Trials in the Bundaberg-Isis Areas

By N. McD. SMITH

Trial work to determine the controlling effect of BHC, aldrin, dieldrin and chlordane on cane grubs damaging crops in the Bundaberg-Isis area is continuing. The species mainly responsible for losses are the two-year-cycle grubs of the Bundaberg beetle, (*Lepidiota trichosterna* Lea), and the Childers beetle, (*Pseudoholophylla furfuracea* Burm).

During the drought of late spring to early autumn of 1957-58, damage to crops from these two pests was severe and small patches in plant and first ratoon blocks were fumigated with carbon bisulphide. It was not considered an economical proposition to treat older fields and after they were harvested and ploughed out, trials with insecticides were established to cover the worst centres of infestation.

Since 1955, a total of over 240 non-replicated and nine replicated trials have been set out in an attempt to assess the effects of the various insecticidal dusts.

The methods of application used to combat these grub pests were aimed at intercepting the probable sensitive stages of the egg and first instar rather than the more resistant third instar. Although this approach to the problem necessitated broadcast dressings, the application of dusts in the drill was not overlooked and some of the plots embraced this method.

Fig. 19—Bureau officers establishing an insecticidal trial against cane grubs in the Bundaberg District.

The rates of the different insecticides per acre within a particular trial were often maintained at comparable levels of active ingredient, and the following tables cover the methods and rates of application.

It will be noted that quantities of

insecticides under test are much higher than the 75 lb. of 20 per cent. BHC (2.6 per cent. gamma isomer) per acre used for controlling the northern greyback grub. This follows the experience gained from earlier field trials in the south where it was indicated that the standard rates of application would be inadequate.

Broadcast Application

Material	Rate—lb. per acre	Method
BHC 2.6 per cent. gamma isomer	600, 300, 150, 75 + 75, 150 + 150, 300 + 300	Disced in prior to planting. First application turned under with final ploughing; second application disced in prior to planting.
BHC 40 per cent. gamma isomer	12½, 25	Disced in prior to planting.
	12½ + 12½, 25 + 25	Two applications involved, the first being turned under with the final ploughing and the second disced in prior to planting.
BHC 2.6 per cent. gamma isomer	230	Two separate methods of application adopted: (1) disced in prior to planting. (2) Turned under with final ploughing.
Aldrin 2½ per cent.	240	
Dieldrin 1½ per cent.	400	
Chlordane 5 per cent.	120	

Drill Application

Material	Rate—lb. per acre	Method
BHC 2.6 per cent. gamma isomer	73 + 73, 90, 150	Applied in drill at time of planting. Where two applications were made the first was applied in the drill at time of planting and the second just prior to closing of drill on the final cultivation.
Aldrin 2½ per cent.	80	Applied in drill at time of planting.
Dieldrin 1½ per cent.	80	
Chlordane 5 per cent.	80	

The observations over the whole series of trials do not, as yet, allow of any general conclusions being drawn as a result of the application of these insecticides. In one case on a Gooburrum sandy forest soil the rates of BHC (2.6 per cent. gamma isomer) above 75 lb. per acre in the drill, resulted in severe inhibition of root growth and subsequent loss of post germination vigour; the loss of vigour was not repeated in the first ratoons. There was also some root stubbing in the plots of 80 lb. of 2½ per cent. aldrin per acre in the trial, but the ill effects were temporary. Throughout the series of drill applications no response in the way of increased vigour in growth has been observed.

In the broadcast series, a replicated 7 x 4 trial planted in spring, 1958, on a sandy Gooburrum soil showed early signs of phytotoxicity in the plots where quantities over 150 lb. of 20 per cent. crude BHC per acre had been ploughed under, or where 600 lb. per acre had been disced in prior to planting. The depressing effect on vigour was very noticeable and was constant throughout the trial. On the other hand, there has been a stimulation in vigour in one of the Isis trials situated on red volcanic loam at Kowbi. The response was evident in all the plots treated with insecticides,

which include BHC (2.6 per cent. gamma isomer), aldrin, dieldrin and chlordane at 6 lb. of active ingredient per acre. This site was selected because of previously high grub populations, and digger wasp activity was intense when the trial was first established, thereby indicating the presence of grubs there at that time. In another plant trial at South Isis, poor growth occurred in an untreated patch immediately adjacent to a plot where 230 lb. of 20 per cent. crude BHC (2.6 per cent. gamma isomer) per acre was disced in prior to planting.

Unsuccessful Use of the Carbide Gun for Scaring Wallabies and Coots

By G. A. Christie

During the latter half of 1958, drought conditions in the Lower Burdekin and Giru areas resulted in a drying of the natural feed for both wallabies and coots, and this brought about an invasion of the cane lands by the former to feed on the young plant and ratoon shoots. Coots congregated on lagoons in the area, their numbers increasing at permanent waterholes as the smaller ones dried, and the adjacent cane suffered quite extensively from the depredations of the fairly large coot population.

Encouraging results from the use of an "Exid" carbide gun in scaring cockatoos in the Proserpine area, prompted a trial with this unit to ascertain the effects on both wallabies and coots in the Burdekin and Giru districts. A farm near Spring Creek in the Giru area provided an excellent site for the test against wallabies since as many as 10 to 20 at one time were feeding on the young plant and ratoon shoots on several fields of this farm. Shooting both by day and night seemed to have little effect on the numbers invading the property, although large numbers were killed by this means. It was noticed that areas where wallabies had been shot and had not been removed, were avoided in subsequent raids by these pests.

At first, the carbide gun, set to operate at seven to eight-minute intervals, completely cleared the pests from the locality, but after an interval of seven to ten days they returned, a few at first, but increasing in numbers later. At each shot of the gun they hopped away, returning to resume feeding before the next shot, the interval of interruption in feeding gradually reducing as they became accustomed to the noise. Finally after 10 to 14 days, they were feeding for four to five minutes in each seven or eight-minute period.

Wallabies were very selective in varieties on which they fed, Trojan and Pindar being passed undamaged, while heavy feeding was observed in Q.50. In a trial planting of Q.58 and Q.63 located in a field of Q.50 on this farm, the two first-mentioned were quite undamaged, while Q.50 was eaten to the last stool adjacent to the Q.58 and Q.63.

Similar results were obtained where the carbide gun was set up in an area being attacked by coots, but the birds stayed away from the locality for a shorter period. Their feeding was interrupted for very brief periods at each discharge of the gun and the overall effect was that birds avoided the area in close proximity to the gun, but continued their damage a short distance away.

The 1959 Field Days

During the course of the four Field Days which were held during May and June at Meringa, Brandon, Mackay and Bundaberg, some 1800 growers were afforded the opportunity of seeing the Bureau's work at those four centres.

On the afternoon of each day, some short addresses were delivered and some extracts from the Director's statements on those occasions are given below.

At the Field Day at Brandon, while discussing the problem of over-production in the Lower Burdekin district, the Director said :—

"The solution of your excess cane problem, in years of over-production, does not appear to lie in standing the crops over and expecting an economic return from the two-year cane. This is not the first year that many of you have had this experience and I doubt whether many of you desire to repeat it. But so long as a restricted market for sugar exists you will certainly continue to produce surplus cane if you farm the same acreage.

"How, then, can you plan your production so as to approximate to peak requirements? I do not think you should do it by reducing fertilizer applications. Every £1 you spend on sulphate of ammonia produces more than £1 worth of cane. So, every £1 saved on sulphate of ammonia means less cane produced, but less profit per ton of cane harvested. In other words the cost of producing each ton of cane will increase. Restriction to peaks is going to reduce your gross income, but do you also wish to raise your cost of production?

The best and most economic solution to the problem is in reducing the farmed area, and farming at the highest efficiency on each acre. In an irrigated district you are in a better position than any other district to plan your production within reasonably close limits. You know from years of experience that, with a given amount of fertilizer and a certain number of waterings, you can produce crops of a certain tonnage. You can, accordingly, plan your harvestable acreage to produce close to your farm peak."

A few days later at the Meringa Experiment Station, Mr. King spoke of chlorotic streak disease and led up to the production problem which would be accentuated if chlorotic streak were completely controlled in Queensland. He said :—

"Now that we have reached a critical stage in our history when crop surpluses will probably be commonplace, we must appreciate that any further measures to reduce crop losses caused by disease will result in still more over-production. This can be the only outcome of successful control of chlorotic streak disease. But the attempts to control the disease cannot be halted on that account. All of our research is aimed at increasing sugar production on each acre of land, and if disease control does not do it, varietal improvement will. But any method of raising production per acre will result in reduced costs on that acre, and the bringing of a disease under control will allow the use of more susceptible varieties which may otherwise have to be discarded.

"In speaking previously to both growers and millers in the industry I have suggested that, in a period when production exceeds market requirements, the logical and most economic method of keeping production down is to reduce areas. Any attempts to cut down on output by using less fertilizer or by cultivating less efficiently will not reduce the cost of production of a ton of cane. But the maintenance of a high degree of efficiency on a reduced acreage will achieve the desired result in the most economical way. It will be something of a paradox if you continue to finance a research organization to improve industry efficiency and, at the same time, deliberately sacrifice your farm efficiency so as to farm your full area and produce less cane."

FREE SERVICES TO CANE GROWERS

The Bureau offers the following free services to *all* cane growers in Queensland:—

Soil Analysis and Fertilizer Recommendations

Your soil will be analysed by the most modern methods, and a report will be posted containing a recommendation covering the type of fertilizer required, the amount per acre, the need for lime, and other relevant information. Phone the nearest Bureau office and the soil samples will be taken as soon as possible.

Culture of Green Manure Seed

Cultures and instructions for the inoculation of the seed of cowpeas, velvet beans, mung beans or any other legume will be posted to any cane grower upon request to The Director, Bureau of Sugar Experiment Stations, Brisbane. Allow a week after receipt of your letter for the culture to be prepared and posted, but as the culture will easily keep a month or so it is a good idea to get your culture when you get your seed. If sowing is delayed, ask for another batch of culture; there is no charge.

Advice on All Phases of Cane Growing

The Bureau staff is at the service of all cane growers. They can best advise you on matters pertaining to varieties, fertilizers, diseases, pests, drainage and cultural methods. Bureau officers are available in every major cane growing district. A phone call will ensure a visit to your farm.